

REMARKS

The Final Office Action dated October 12, 2011 has been carefully reviewed, and the foregoing amendment and the following remarks have been made in consequence thereof.

Claims 1-30 are pending in this application. Claims 1-14 and 28-34 stand rejected. Claims 15-27 have been canceled.

Claims 1, 28 and 30 have been amended to recite that the electrodes are non-cylindrical. Support for this amendment is provided throughout the specification. Specifically, the background explicitly identifies issues suffered by electrodes having a cylindrical configuration, and several of the electrode configurations described in the specification are non-cylindrical.

Interview Summary

Applicants and the undersigned wish to thank Examiner Phasge for the courtesies he extended in a telephone conversation with Adam Wuller and Jonathan Pollack that occurred on December 08, 2011. During the conversation, the biconcave treatment zone recited in the independent claims was discussed. No agreement was reached.

Claim Rejection – 35 U.S.C. § 102(b)

The rejection of Claims 28-30 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,662,031 to Qin et al. (“Qin”) is respectfully traversed.

Qin describes a processor (400) that has a first electrode (401) and a second electrode (402) each including a convex face region or dome (408). An electrode spacer (420) forms a **cylindrical** treatment zone passage (430) between the first electrode (401) and the second electrode (402). Qin also describes a processor (110) with a first electrode (131) centrally located and a second electrode (132) arranged around the first electrode (131). The treatment zone faces of the first electrode (131) and the second electrode (132) **are longitudinally scalloped**. The undulating treatment faces of the first electrode (131) and the second electrode (132) induce additional agitation in the fluid being processed.

As recited in background of the instant application (paragraphs 5 and 6), “the foregoing coaxial treatment chamber is far from an optimal solution since it suffers from

similar deficiencies to the parallel plate geometry. Edge effects lead to an under utilization of the highest field intensity, which translates into energy inefficiency and higher cost. The conventional coaxial treatment chambers also allow eddy currents to develop at the mouth of the fluid treatment chamber, which in turn limits the maximum flow rate of the chamber. Further, such chambers may allow treated and untreated product to mix, thereby limiting the effectiveness of the treatment chamber.”

Accordingly it will be appreciated that the present invention provides, *inter alia*, a non-cylindrical electrode geometry. This unique geometry provides a biconcave treatment zone where the liquid is exposed to intense electric field uniformly. Further, this geometry provides a flow system that is laminar, and avoids stagnant areas for the flowing liquid. As a result the flow rate can be high but the flow remains laminar. The geometry eliminates the long axial flow, which is one of the commonly used designs - concentric cylindrical geometry.

Accordingly, independent Claims 28 and 30 are submitted to be patentable over Qin.

Claims 29 and 32-34 each depend from one of independent Claim 28 and independent Claim 30. When the recitations of dependent Claims 29 and 32-34 are considered in combination with the recitations of Claims 28 and 30, Applicants respectfully submit that Claims 29 and 32-34 are likewise patentable over Qin.

For the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claims 28-30 be withdrawn.

Claim Rejections – 35 U.S.C. § 103(a)

The rejection of Claims 1-9 under 35 U.S.C. § 103(a) as being unpatentable over Qin in view of U.S. Patent No. 3,691,050 to Sayre is respectfully traversed.

Qin is described above.

Sayre describes an electric field water purification system that includes an upper electrode (66) and a lower electrode (75). The upper electrode (66) includes a ring of conductive material that is mounted adjacent to a tube (58). The lower electrode (75) is located in a reservoir below the tube (58), and includes a metallic liquid, such as mercury. The water purification system may be a gravity fed system.

Claim 1 has been amended to recite, *inter alia*, "...a biconcave treatment zone coupled between the fluid inlet and the fluid outlet...." Accordingly, it is clear that the biconcave treatment zone cannot be interpreted as a portion of the treatment zone in Qin, as suggested by the Examiner, since Qin teaches a plurality of alternating biconcave and biconvex regions coupled between the fluid inlet and the fluid outlet. Thus, the treatment zone of Qin that is coupled between the fluid inlet and the fluid outlet is clearly scalloped in shape and not biconcave.

Further, Claim 1 has been amended to recite, *inter alia*, "...the biconcave treatment zone defined by an electrode assembly comprising at least two non-cylindrical electrodes...." This physical limitation contributes to "the biconcave treatment zone including the most intense electric field generated by the electrode assembly for treatment of the fluid".

In contrast, as recited above, the inner and outer electrodes of Qin are cylindrical, which often results in edge effects and eddy currents. The deficiencies in Qin are not remedied by Sayre.

For at least these reasons, Claim 1 is submitted to be patentable over Qin in view of Sayre.

Claims 2-9 and 31 depend from independent Claim 1. When the recitations of dependent Claims 2-9 and 31 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claims 2-9 and 31 likewise are patentable over Qin in view of Sayre.

Further, the Examiner has suggested that claims 2-9 are obvious because modification to shape has been well settled to have been within the purview of the ordinary artisan. Applicants respectfully disagree, since changing the shape of an electrode has more than a perfunctory effect. This is exemplified in Qin (column 5, lines 60-63), where it is stated that changing the shape of the electrode face from straight to scalloped increases the effective electrical resistance across the treatment chamber without reducing the processed fluid path length. Accordingly, changing the shape of the electrodes can materially affect the performance of the treatment chamber.

The shapes of the electrodes recited in Claims 2-9 define specific non-cylindrical configurations for the electrodes. As recited above, non-cylindrical electrode configurations

provide a distinct advantage over the cylindrical electrode configurations in the prior art and are therefore, non-obvious improvements.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-9 be withdrawn.

The rejection of Claims 10-14 under 35 U.S.C. § 103(a) as being unpatentable over Qin in view of Sayre, and further in view of U.S. Patent No. 2,192,249 to White is respectfully traversed.

Qin and Sayre are described above.

White describes an electrode precipitator encased in a cylindrical housing (4). The precipitator includes a tubular electrode member (13) adapted to accommodate a stream of gas flowing therethrough. The tubular electrode member (13) surrounds a central electrode assembly that includes a lower part having a fine wire discharge electrode (26) and an upper part having an extended surface electrode. The fine wire discharge electrode (26) creates an ionizing field in cooperation with the surrounding tubular electrode member (13). Notably, White does not describe or suggest a biconcave treatment zone coupled between a fluid inlet and a fluid outlet, the biconcave treatment zone defined by an electrode assembly including at least two non-cylindrical electrodes.

When the recitations of dependent Claims 10-14 are considered in combination with the recitations of Claim 1, Applicants respectfully submit that Claims 10-14 likewise are patentable over Qin in view of Sayre and White.

For the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 10-14 be withdrawn.

Conclusion

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Respectfully submitted,



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